

## 2004 RAPTOR BREEDING SEASON REPORT

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**Abstract:** The 2004 breeding season was the 18<sup>th</sup> year of raptor monitoring at Pinnacles National Monument. Field observations began 7 January 2004 and ended 30 June 2004.

Pinnacles National Monument provides a diverse habitat for numerous cliff-nesting raptors, including sensitive species such as prairie falcons (*Falco mexicanus*) and golden eagles (*Aquila chrysaetos*), as well as a spectacular array of summits and cliff-wall routes for rock-climbers. Therefore, the behavioral and physical effect that climbers and off-trail hikers have on cliff-nesting raptors is studied.

The 2004 raptor-breeding season was successful, particularly for prairie falcons. Eighteen territories were occupied with eleven active-breeding prairie falcon territories confirmed. Thirty-six prairie falcons hatched, with thirty-three possibly fledging and thirty-one confirmed. Two territories failed (through predation) and were abandoned, one pair occupied a territory without nesting for the season, and one single falcon occupied a territory for the season.

Of note, a peregrine falcon (*Falco peregrinus*) pair occupied the Hawkins territory throughout the 2004 breeding season. Although they did not nest this year, their presence marked the first time in 40 years that a peregrine falcon pair has occupied a territory through the breeding season at Pinnacles National Monument.

Golden eagles were observed throughout the park. A new eagle nest was discovered at North Chalone Peak. Although the nest produced 1 hatchling, the nest failed (likely due to predation), and the site was abandoned. Additionally, five nests in three known territories in the park were not occupied this year. One known nest in a territory outside of the park produced one eaglet and a likely but unconfirmed fledgling.

Additional raptor species active and nesting in the park included red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), and Cooper's hawks (*Accipiter cooperii*). Red-tailed hawk pairs occupied four territories, hatched eight young, and produced six confirmed fledglings, with eight total fledglings likely. American kestrels occupied eleven territories, with two fledglings confirmed in one territory, and a premature fledgling found in another territory. Cooper's hawks were observed occupying three territories, with 1 fledgling observed near Chalone Creek along the East side road, near the Chalone housing turnoff.

2004 also marked the first year that captive-bred California condors (*Gymnogyps californianus*) were released at Pinnacles National Monument, with up to 6 condors active from Grassy Canyon to the High Peaks throughout the season. Condors were aggressively stooped by territorial raptors including peregrine and prairie falcons, and golden eagles, on numerous occasions, with one incident of an adult golden eagle hitting a condor and driving it from a feeding site. Condors were also observed displacing a juvenile golden eagle from the Grassy Canyon feeding site.

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## STUDY AREA AND METHODS

Pinnacles National Monument (PNM) is located in the Gabilan Mountains of the central Coast Range of California. PNM covers 24,252 acres with Elevation ranging from 244 to 982 meters. The climate is Mediterranean with hot, dry summers and cool, damp winters. Temperatures range from a mean of 8.2° C in January to 22.6° C in July. The majority of the rainfall occurs from November to April with average yearly rainfall of 44 cm (National Oceanic and Atmospheric Administration, NOAA, 1997).

PNM provides a diverse range of habitat types for birds and other species: volcanic rock formations and outcroppings; California mixed chaparral; pine-oak woodlands; grasslands; and riparian habitats.

Survey methods followed the standard operating procedures detailed in the 2004 Raptor Monitoring Protocol for Pinnacles National Monument, California (Emmons & Fesnock).

Potential and established cliff-nesting raptor territories in high-use climbing areas and remote locations in the park were surveyed using spotting scopes (15-45x) and binoculars (8x40 and 10x42). Observations were made from the locations that provided the best view of an eyrie or territory. A Garmin III Plus GPS unit was used to plot every observation spot. Surveys typically lasted 1.5 to 6 hours, depending upon the raptor behavior and amount of data collection needed. For a survey to be classified as “no birds” a minimum watch time of 5 hours was required. Territories were revisited on a 7-21 day schedule based on visitor use, the progress and age of raptors at territories (to obtain the most critical data for each territory for that time period), and the number of territories to be monitored. High visitor use areas were monitored more frequently and during weekend days when climbers were more likely to be present. While other monitoring programs estimate fledging success at 90% fledge age (Anderson et al. 1997, Steenhof et al. 1982, Steenhof 1998), our protocol was to end surveys once all young raptors were confirmed fledged. For a territory to be classified as unoccupied, a minimum of three surveys of “no birds” confirmed over three different months was required. Survey duration was ultimately dependent upon visibility. When birds cooperated and needed data was collected in short survey duration, nearby territories were visited as well.

In January, late afternoon and evening surveys were conducted to locate territorial prairie falcons. Perching, flying, diving, interacting, and roosting locations were sought as evidence of territorial behaviors and territory establishment. By mid-January climbing advisories went into effect and territories were monitored to record courtship behaviors, territorial disputes, and disturbance. Advisories were used to inform visitors of areas likely to have breeding raptors. Generally these areas were occupied by raptors at least once during the preceding three years. Visitors were advised to avoid these areas. Advisory areas with posted signs included the Balconies, Hawkins, Scout Peak, and Little Pinnacles territories.

In late winter and early spring, copulation behavior was observed and duration quantified. Food-swapping and eyrie selection were also recorded. Surveys during this period focused on evening and late-afternoon surveys until eyrie selections were made.

Incubation of nesting prairie falcons was determined by female prairie falcons (and to a lesser extent male falcons during nest switches) flying into a nest hole and not reappearing for periods of time. Attempts to count eggs were made by surveying when the best light was available for visibility, and when the incubating falcons temporarily left the nest during food drops and nest switches. Soft incubation – the onset of incubation - was determined by a small number of eggs

laid and the female incubating for short durations (15-75 minutes). Hard incubation was characterized by the adult falcons – primarily the females – incubating a full clutch of eggs for hours in duration. Surveys were done in early morning and late evening hours to catch periods of greatest raptor activity, such as food drops, and to have a maximum amount of time for observation.

Hatched young prairie falcons were aged by physical features using an aging guide (Moritsch 1983). Hatch date was determined by counting backwards from at least two – and preferably three or more - independent agings. Nestlings were observed from late spring to early summer, primarily during early morning and evening hours when they were most active, but observation periods at midday provided further data on nestling activity while prairie falcon adults were hunting for prey away from the nest sites. From early to mid summer, prairie falcon young were observed primarily in early to mid morning hours, when they were nearing fledging and most actively exercise flapping. Full fledging of falcon young was confirmed by all young being seen perched and / or in flight away from the nest site, with fledging dates determined by the coordination and strength of flight, the size of perches, and the amount of vocalization during flight.

Weather was always an important factor. During temperature extremes, heavy fog, or rain, most birds of prey were not active and therefore monitoring was not done during these periods.

## RESULTS

### Prairie Falcons, *Falco mexicanus*

The first prairie falcons were observed at Crowley and North Balconies on 7 January 2004. The first confirmed pair of prairie falcons was observed at Canyon North of Willow Springs on 20 January 2004. Eighteen territories were occupied, by eleven nesting pairs, a non-nesting pair, and a falcon single. All of these territories have been used historically by prairie falcons.

Additionally, eight of the eleven eyries chosen by prairie falcons were used in previous years, although the historic nest site at Teapot had not been used by prairie falcons in 20 years. The last confirmed nesting pair was documented on 16 March 2004 in the Frog territory. Prairie falcon nest details are listed in Table 1 below. Numbers in the “Closest Climb” column refer to climbing route numbers listed in the Climber’s Guide to Pinnacles National Monument, 2<sup>nd</sup> Edition, by David Rubine (1995).

Table 1: 2004 Prairie Falcon Nest Sites

Territory	Nest Used/ Last Year Used	Sensitivity to Visitor Disturbance	Height (ft) From Ground	Height (ft) From Top	Closest Climb	Aspect
Willow Springs Slide	WSS-2/ 2000	Low				SSW
Narrows	NARR-3/ NEW	Low	20	20	none	S
Pig Canyon	PIG-6/ 2002	Low				E
Frog / Hand	Frog-2/ NEW (by PRFA)	Medium	30	40	#140	ESE
Little Pinnacles	LP-8/ 2003	High				SE
Goat Rock	Goat-2/ 1999	High				NNE
Teapot Dome	TD-1/ 1984	High				ESE
Hawkins Peak	HP-5/ 1998	High				E
North Balconies	NB-6/ NEW	High	50	30	#308-310	SSW
Crowley Towers	CT-2/ 2000	High				E
North Chalone	NC-1/ 2003	Low				E

Several prairie falcons did not nest or produce young this year. A falcon pair at Drywall actively perched, courted, and inspected historic nest sites late in the breeding season, but did not nest at the territory. A single, unpaired prairie falcon arrived at the D. Soto Canyon territory late in the breeding season, but did not nest or produce young.

Incubation was first observed at Hawkins on 30 March 2004. The first hatching occurred between 24-30 April 2004 at North Chalone Peak. The first fledging took place from 3-9 June 2004, also at North Chalone Peak. The last young to fledge were the falcons at Teapot Dome, from 15-16 June 2004. At least thirty-six chicks were produced (with Goat chick numbers unconfirmed prior to nest failure) with thirty-one confirmed fledging, and two more (at the North Chalone territory) likely fledging as well. Eggs were counted this season at the Willow Springs Slide and Narrows nests, with 4 eggs observed at each nest. Eggs could not be observed at the other falcon nest sites

this year, due to nest site locations and egg placement within the nest sites during incubation. Chicks were successfully counted at ten territories with a mean of 3.6 chicks per eyrie and 3.3 fledglings per eyrie (including likely full fledging at the North Chalone site). (See Table 2 below for the 2004 summary of prairie falcon nesting at the park.)

Table 2: 2004 PNM Prairie Falcon Telemetry / Breeding Summary

Territory	Nest Used/ Last Year Used	Adult Captured: Sex/ Date/ Capture Status	# Eggs Laid	# Young Hatched	# Young Known/ Possibly Fledged
Willow Springs Slide	WSS-2/ 2000	No.	4	4	4/ 4
Narrows	NARR-3/ NEW	No.	4	4	4/ 4
Pig Canyon	PIG-6/ 2002	No.	Unknown.	4	4/ 4
Frog / Hand	Frog-2/ NEW (by PRFA)	No.	Unknown.	2	1/ 1
Little Pinnacles	LP-8/ 2003	No.	Unknown.	0	0 Note: nest failure, likely predation.
Goat Rock	Goat-2/ 1999	No.	Unknown.	2	0 Note: nest failure, likely predation.
Teapot Dome	TD-1/ 1984	No.	Unknown.	5	5/ 5
Hawkins Peak	HP-5/ 1998	Yes. Male/ 3-2-04/ New.	Unknown.	5	5/ 5
North Balconies	NB-6/ NEW	Yes. Female/ 3-3-04/ New. Male/ 3-3-04/ Recap.	Unknown.	2	2/ 2
Crowley Towers	CT-2/ 2000	No.	Unknown.	5	5/ 5
North Chalone	NC-1/ 2003	Yes. Male & Female/ 3-4-04/ New.	Unknown.	3	1/ 3

Prairie falcon nest productivity for the 2004 season was generally consistent with the productivity averages for the past 18 years of monitoring data (see Table 3 below). Prairie falcons occupied 18 territories in 2004, more than 6 over the 11.67 average, and the highest documented over the 18-year study. However, this figure is shaped largely by the particular raptor monitor's awareness and interpretation of falcon behavior, and perspective on territorial boundaries. As such, interpreting meaning from this figure is difficult. The remaining statistics gathered for 2004 are more consistent with and only slightly higher than the 18-year averages. There were 11 prairie falcon nesting territories in 2004 versus the 9.22 average; 9 successful nests in 2004 versus the 7.61 average; 33 falcon chicks fledged in 2004 versus the 26 average; and 3.67 chicks / nest fledged versus the 3.22 average. The consistency between the 2004 season numbers and 18-year averages suggest that the 2004 season was a typical year for nesting prairie falcons.

Table 3: 1984-2004 Prairie Falcon Nesting Productivity

Year	Territories Occupied	Territories Nesting	Successful Nests	# Chicks	# Chicks/Nest
1984	10	8	8	27	3.375
1987	6	4	4	10	2.5
1988	11	9	8	24	3
1989	12	10	8	19	2.375
1990	13	11	9	35	3.88889
1991	13	11	10	31	3.1
1992	13	11	10	34	3.4
1993	13	12	10	35	3.5
1994	14	12	12	42	3.5
1995	13	11	8	24	3
1996	11	10	9	34	3.77778
1997	12	8	6	26	4.33333
1998	13	7	0	0	0
1999	10	8	6	27	4.5
2000	10	8	7	22	3.14286
2001	11	9	7	24	3.42857
2002	12	8	7	22	3.14286
2003	13	9	8	32	4
2004	18	11	9	33	3.66667
<b>Averages</b>	<b>11.6667</b>	<b>9.22222</b>	<b>7.61111</b>	<b>26</b>	<b>3.22024</b>

This year, three adult male prairie falcons and two adult females were captured as part of the third and final year of a graduate research project through USGS, by former raptor monitor Shelley Buranek. Falcons were captured at three territories using a Great Horned Owl as lure and a dho-gaza net. The team collected data such as: length, tarsal length, primary feather length, mass, and a blood sample for DNA. Four of the falcons were newly captured birds, and were outfitted with radio backpack transmitters with a life span of one year, and banded prior to release. The remaining prairie falcon – the Balconies male – was a recaptured bird first banded in 2002, and previously recaptured in 2003. Data was collected for the falcon, but the male was not re-outfitted with a radio backpack transmitter because he was caught within the one-year life span of the transmitters, after being outfitted with a new transmitter again in 2003. The purpose of this auxiliary study is to better understand how the population of foraging prairie falcons relates to land uses on private lands surrounding PNM. The birds were caught from February 23 to March 5. (See Table 2 above.) By conducting radio telemetry flights over the park, 5 out of 6 falcons trapped in 2003 were confirmed returned to the park: the males from Balconies, Willow Spring Slide, and Scout, and the females from Crowley and Pig. The female trapped at Hawkins was not accounted for.

#### Peregrine Falcons, *Falco peregrinus*

Of particular note this year was a peregrine falcon pair that occupied the Hawkins territory, alongside a nesting prairie falcon pair, throughout the breeding season. The peregrine falcon pair was first observed circling above Scout Peak and Goat Rock on 3 March 2004, and was active throughout the High Peaks. Although the two falcons did not nest this year, they attempted copulation several times, inspected historic nest sites at Hawkins regularly, and actively stooped

other raptors in the Hawkins territory. The presence of the peregrine falcon pair throughout the season marks the first time in 40 years that a pair of the raptors has successfully occupied a territory at PNM through the breeding season.

#### California Condors, *Gymnogyps californianus*

2004 also marked the first year that captive-bred California condors were released into PNM, with up to 6 juvenile condors active in the park. The condors were focused primarily near the holding pen and feeding site in Grassy Canyon through mid-January, and began taking longer flights into Bear Gulch, Condor Gulch, and the central High Peaks through April. From May to July, the condors traveled further abroad onto private land outside of PNM. Territorial interactions between condors and other raptors were observed. Early in the breeding season, golden eagles, red-tailed hawks, and American kestrels wailed and stooped at condors in Grassy Canyon, likely due to their unfamiliarity with condors at PNM, and the use of Grassy Canyon as a feeding territory for many raptors. Golden eagles also occasionally presented talons and flushed condors from cattle carcasses at the Grassy Canyon feeding sites. On one occasion, an adult golden eagle was observed displacing a condor from a carcass, pummeling it to the ground before the condor flushed away. Despite this physical interaction, no lasting physical injuries to the attacked condor were observed. The juvenile condors were also observed displacing a juvenile golden eagle from feeding sites in Grassy Canyon, chasing the eagle off from a cattle carcass. From mid-February through mid-April, condors circling over and perching in the High Peaks were also occasionally stooped at and scolded by territorial prairie and peregrine falcons, particularly near Hawkins, but no physical injuries to condors were documented.

#### Golden Eagles, *Aquila chrysaetos*

Golden eagles were observed nesting in PNM this year, at a previously undocumented site on the south slopes of North Chalone Peak, and at the Eucalyptus Grove outside of PNM's West Side. Golden eagle adults and juveniles were active at four additional territories in the park throughout the nesting season. Two of these territories – Frog Canyon / South Chalone Peak and Eagle Rock – contained five former nest sites observed in mid-winter through late spring, with no new greenery added to any of the nests. The third territory – Drywall Slide – contained no former nest sites, but a golden eagle pair repeatedly perched and copulated near Drywall through the first half of the breeding season, occasionally flying south to Frog Canyon. Although unconfirmed, this pair may have represented the eagle pair that nested late on North Chalone Peak.

Golden eagle nesting was confirmed at North Chalone Peak and the Eucalyptus Grove. The new nest site at North Chalone was located on the east side of the south slopes of North Chalone Peak, south of the pig fence and South Wilderness Trail near the saddle between North and South Chalone Peaks. The nest site at the Eucalyptus Grove was used last year by a nesting eagle pair. Incubation was confirmed at the Eucalyptus Grove site, but not at North Chalone, where the new nest site was discovered later in the season. Nestlings were observed at both territories, with 1 chick seen at each nest. The North Chalone nest site failed, likely due to predation, late in the breeding season, and the golden eagle pair abandoned the territory by early June. Although fledging of the eaglet from the Eucalyptus Grove nest was not confirmed, it is likely that the nestling fledged, as it was observed within days of expected fledging. Eagles were occasionally seen off the monument.

#### Red-tailed Hawks, *Buteo jamaicensis*

Four red-tailed hawk territories with nesting pairs were documented this year, at historic nest sites at Hippo, Guard Rock, Frog / Hand, and the Western Front. Incubation was observed at the Hippo nest site, with the Guard Rock, Frog / Hand, and Western Front nests confirmed active later, after nestlings had hatched. The earliest confirmed hatching occurred at the Hippo nest from 25-26 April 2004, with the latest hatching of the season estimated at 29 April to 7 May 2004 at the Frog / Hand site. Nestlings were observed at all four nest sites, with 2 young each in the Hippo and Guard Rock sites, 3 young in the Western front site, and 1 young in the Frog / Hand site. Full fledging of young was confirmed at the Hippo and Guard Rock sites. 1 young was confirmed fledged from the Western Front nest, and fledge was not confirmed at the Frog / Hand site. However, full fledge of young was likely at both nest sites, based on observations of nestlings with full juvenile plumage just prior to expected fledge dates. The Hippo young fledged on 13 June 2004, with the Guard Rock young fledging between 12-15 June 2004. The Frog / Hand young likely fledged latest in the season, estimated from 17-24 June 2004.

#### American Kestrels, *Falco sparverius*

Kestrels were observed occupying eleven territories in and just outside of the park this year, with evidence of nesting observed in three of the territories: South Balconies, Drywall, and McCabe Canyon. In McCabe Canyon, a kestrel fledgling, likely premature given downy plumage and lack of flight, was observed huddled at the base of an oak tree, on 8 May 2004. In the South Balconies territory, two recently fledged kestrel young were observed landing awkwardly and circling near Tilting Terrace on 10 June 2004. A nesting pair of kestrels was confirmed at Drywall Slide territory feeding young at an historic nest site, but hatchling numbers were not confirmed due to lack of visibility into the nest site. Other kestrel pairs not confirmed nesting were active at South Wilderness Rock, D. Soto Canyon, Frog Canyon, Neglected Valley, Scout Peak, Hawkins, the Eucalyptus Grove, and North Chalone Peak.

#### Cooper's Hawks, *Accipiter cooperii*

Cooper's hawks were active in the park throughout the breeding season. Although no active nest sites were confirmed, at least one fledgling hawk was observed near the east side Visitor Center / Chalone housing road junction in mid-June, with one to two adults active in the Chalone housing area throughout the breeding season. Two Cooper's hawks were also active in the gray pine grove in upper Marion Canyon, likely a territorial pair. A Cooper's hawk pair was also active near the Balconies Cave Trail throughout the season, with an adult stooping a peregrine falcon female repeatedly in late June.

#### Owls

There were no reports of owls nesting in PNM this season. Great horned owls, *Bubo virginianus*, were heard vocalizing in Hanging Valley, in Juniper Canyon, near the base of Hippo in Upper Condor Gulch, and W of Drywall Slide. Single great horned owls were heard in oak groves near South Wilderness Rock, and in the grove near Dry Creek crossing. Western screech owls, *Otus kennicottii*, were heard calling near the Bear Gulch Visitor Center, along the Old Pinnacles Trail just S of the N. Wilderness Trail junction, and in oaks near the first gate N up Marion Canyon. Northern saw-whet owls, *Aegolius acadicus*, were heard vocalizing along the S. Wilderness Trail, with a pair calling to each other at the Grassy Canyon creek crossing, and a single calling south along the Chalone Creek drainage. One barn owl, *Tyto alba*, was observed roosting in an old stick nest site in D. Soto Canyon, and a second barn owl was found dead near the roadside in the east side entrance meadow. One long-eared owl, *Asio otus*, was observed perching in live oaks in McCabe Canyon.



## Other Raptors

Two pairs of red-shouldered hawks, *Buteo lineatus*, were seen in the Pinnacles Campground from January to March, with one pair territorially focused south along Chalone Creek, and the other more active at the northern end of the Pinnacles Campground. Although nesting of one or both pairs was likely, no nest sites were confirmed this year.

Northern harriers, *Circus cyaneus*, were observed soaring north over Hawkins, and along Chalone Creek near the Old Pinnacles Trail, south of the N. Wilderness Trail turnoff.

A pair of white-tailed kites, *Elanus caeruleus*, was seen flying throughout the breeding season, from near the meadow near the east entrance to PNM, to the Chalone Creek area along the S. Wilderness Trail. Although nesting was not confirmed, the regular presence of the kite pair throughout the season strongly suggests at least territorial occupation along the southern Chalone Creek drainage.

Sharp-shinned hawks, *Accipiter striatus*, were active throughout the park. No nesting was confirmed, but single hawks were observed at Drywall Slide, along the Old Pinnacles Trail north of the Chalone maintenance yard, near Little Pinnacles, D. Soto Canyon, Hawkins, Pig Canyon, Willow Spring, Egg, S. Wilderness Rock, and in Marion Canyon.

An adult female merlin, *Falco columbarius*, was perching for 60 minutes on gray pines near the Chaparral parking area, on 7 March 2004.

Unusual raptors sighted in PNM also included a rough-legged hawk, *Buteo lagopus*, and a ferruginous hawk, *Buteo regalis*, both above North Chalone Peak, and an adult bald eagle, *Haliaeetus leucocephalus*, soaring from over Grassy Canyon north past Willow Spring Slide.

## Climbing Management Actions

Climbing advisories were put in place in January, and revised in March to reflect active, nesting prairie falcon territories. Climbing advisories were put in place in areas with known climber usage to protect nesting raptors from disturbance. Signs detailing climbing advisories were posted at Little Pinnacles, Balconies, Hawkins, and Scout Peak territories. Other climbing advisory areas – detailed in press releases, trailhead signs, and pamphlets at the Bear Gulch Visitor Center – included Crowley Towers, Egg, Tunnel, Teapot Dome, Frog / Hand, and Goat Rock / Resurrection Wall territories. All of the above territories were actively used and occupied by nesting falcon pairs.

## Human Interactions

Climbers did an excellent job of heeding climbing / raptor advisories this year. Off-trail hikers were observed in advisory areas on several occasions early in the breeding season, at Resurrection Wall, in the High Peaks, Scout area, and at Hawkins, and the Hawkins advisory sign was uprooted and discarded trailside. (A party of climbers later informed rangers of this incident, and the sign was re-posted, with no further incident through the remainder of the breeding season.) Private planes and military helicopters were observed on numerous occasions below 100 feet within Little Pinnacles, Hawkins, Central High Peaks, and Balconies territories. However, no nesting prairie falcons were seriously disturbed during incubation, feeding, and raising of young. Prairie falcon adults in the Scout, Crowley, South Balconies, and Hawkins territories did respond to the presence of hikers and raptor monitors by circling and wailing above their respective territories, but did not otherwise display significant and prolonged disturbance behavior threatening nest productivity and survivorship. In general, the advisory signs for raptor area closures and postings at climbing accesses seem to be effective, given full fledging in all advisory territories except Little Pinnacles, where predation of the nest site was likely. However, increased visitor presence in advisory areas reflected lack of full compliance to posted advisories, and is of concern to resource protection in general and protection of raptor productivity in particular at PNM.

International Migratory Bird Day (7 May 2004) was celebrated at PNM with several days of interpretive talks and programs. On the evening of 7 May 2004, Ranger Charles Ewing led an evening program focusing on avian habitats, passerine and raptor species, and the condor program at PNM. On 7 May 2004, Rangers Wendy Artz and Charles Ewing, and Raptor Monitor Gavin Emmons led a birding walk in the Bench Trail to lower Chalone Creek area, documenting migrating and breeding raptors (including red-tailed and red-shouldered hawks), passerines, and near-passerines. Rangers Wendy Artz and David Soto led additional bird walks for visitors on 8 May 2004, monitoring species diversity near the Chaparral Parking Area on the west side of the park, and on the east side of the park along the Old Pinnacles Trail. On 9 May 2004, Gavin Emmons and SCA Intern Alacia Welch also interpreted raptor nesting, monitoring, and management for visitors from a watchspot near the Hawkins and Teapot Dome prairie falcon eyries.

## DISCUSSION / RECOMMENDATIONS

Prairie falcon nest phenology for the 2004 breeding season followed the average rates documented through the previous 17 years of monitoring. The earliest hatch date range for this year was late April (24-30 April 2004 at North Chalone), and the latest falcon fledge date was in mid June (15-16 June 2004 at Teapot Dome). Prairie falcon nesting this year also followed established success rate of fledglings produced per nest. From ten nest sites, the average rate of fledglings produced was 3.3, compared to the 17-year average of 3.4. Three nest sites – at Crowley, Teapot Dome, and Hawkins – produced 5 fledglings, higher than the prairie falcon average of 4 chicks per nest. Due to the lack of quantified data, it is difficult to determine specific factors leading to this average rate of falcon breeding success and to falcon nest phenology this year in general. High rates of precipitation in March may have resulted in increased prey availability, providing falcons with greater food resources for nestlings. However, effects of prey availability may have been offset by the late timing and intensity of the precipitation, which resulted in minor flooding throughout the park. Park visitors generally adhering to raptor advisories and not disturbing nest sites likely supported the fledgling success rates as well, allowing adults to focus on feeding and rearing of young rather than responding to human disturbances of nest sites. However, as noted above, off-trail hikers in advisory areas may have provided additional pressures discouraging prairie falcons from defense and maintenance at certain nest sites. Nest failure at Goat Rock and Little Pinnacles was likely due to nest predation, with great horned owls, red-tailed hawks, common ravens, and golden eagles all active in the vicinity of the nests. The Frog / Hand nest site also hatched at least two falcon young but only fledged one premature young, likely due to a predation event at the nest. (See Appendix 2: Falcon Nesting Phenology and Success, for more details.)

The raptor-monitoring season at PNM was unusual this year because of 2 species in particular: peregrine falcons and California condors. Neither species nested, but the presence of both was significant historically, and in relation to those raptor species that did breed in the park. For the first time in 40 years, a peregrine falcon pair occupied a territory – at Hawkins – through the nesting season. Although the adult male and female peregrine falcons did not nest or produce young, they actively defended the Hawkins territory by stooping on condors, turkey vultures, and prairie falcons in the High Peaks. The peregrine falcon pair was also observed attempting copulation and inspecting historic nest sites at Hawkins. The peregrine pair was also stooped by other territorial raptors, including the Hawkins prairie falcon pair and the Hippo red-tailed hawk pair. The presence of the peregrine pair provides exciting evidence of the recovery and return of the species to Pinnacles National Monument, and hopefully to nesting attempts by peregrine falcons at the park in the future.

This year also marked the first release of captive-bred California condors at PNM, with up to 6 juvenile males flying in and near the park from January through the breeding season of nesting raptors. In 1982, the federally endangered California condor was represented by only 22 individuals. In 2003-2004, PNM became the most recent condor release site, as a part of a national recovery effort attempting to restore free-flying condor numbers throughout the United States. As juvenile males, the condors released at PNM were not potential breeders, but were often visible in the High Peaks and over Grassy Canyon, circling and perching. Several raptor species, including prairie and peregrine falcons, golden eagles, and American kestrels, displayed territorial aggression by stooping condors flying near nest sites or in occupied territories, but no injuries were sustained to the condors. Perhaps the most significant implication of the presence of condors in the park was the increased visitor interest in the birds. Especially in January through March, this led occasionally to visitors hiking off-trail into advisory areas in attempts to see the

condors at closer proximity. Although no condors or nesting raptors were apparently threatened by this activity, a stricter adherence to park resource protection policies by law enforcement rangers in particular and park staff in general, would help ensure the reproduction of wild raptor species as well as the protection of captive-bred condors in the park. Increased interpretation of raptor sensitivity to disturbance, by rangers and posting of signs throughout the High Peaks, would also help impress upon visitors their responsibilities at the park and provide education tools for respecting park goals and policies.

The nesting season at PNM was also unusual this year in regards to the high number of new and historic nest sites, for falcons as well as other raptor species including red-tailed hawks, American kestrels, and golden eagles. Over the course of the breeding season, 18 prairie falcon territories were occupied by 13 falcon pairs, with 3 nesting sites newly documented (4% of 74 total prairie falcon nest sites historically), and 1 – the Teapot nest – used by falcons for the first time in 20 years. Four active red-tailed hawk nests – matching last year’s park record for the amount of nesting territories active in a season – were documented, with fledglings confirmed from 3 nests and likely from the 4th. Eleven American kestrel territories were observed, with confirmed fledging of young documented in 2 territories. Two golden eagle nests were documented, at a new nest site on the southern slopes of North Chalone Peak, and in the Eucalyptus Grove just outside the west entrance to the park. The Eucalyptus Grove nest successfully raised and fledged 1 eaglet. Although the eagle nest on North Chalone Peak hatched 1 young, the nest failed and was abandoned before fledging, likely due to predation. Although no nest sites were observed, Cooper’s hawk pairs were observed in 3 territories, and a fledgling was observed near the Visitor Center / Chalone housing road junction.

Although certain factors, such as prey availability, lack of human disturbance, and low temperatures through late May, were likely significant in determining the high number of nesting raptor species and sites documented this year, I believe that the experience, training, and efforts of the raptor monitor and of other park staff also played invaluable roles. The survey protocols in place at PNM worked well and provided the raptor monitor with a comprehensive framework for documenting the priority raptor species – prairie falcons and golden eagles – as well as “non-target” species such as red-tailed hawks and American kestrels. Park staff conducting fieldwork in the backcountry of PNM, including the vegetation mapping crew, exotic plant management crew, interpretive rangers, and biological technicians, also provided excellent reports on raptor activity and nesting that allowed for the documentation of new nest sites and territories, and the more effective monitoring of non-sensitive raptor species including red-tailed hawks and Cooper’s hawks, throughout the breeding season.

The importance of human observations, communication of raptor sightings, and effective monitoring was also revealed in the raptor species for which little or no breeding information was gathered this year. Although Cooper’s, sharp-shinned, and red-shouldered hawks, and white-tailed kites, very likely bred in or near the park and produced fledglings this year, nest sites and documented fledging of young were not confirmed within the park. However, juvenile Cooper’s hawks were seen by park staff in mid-June, at least pointing to the strong likelihood of successful breeding of these accipiters. Owl species were heard and seen throughout the breeding season, with pairs of great horned owls likely near the Bear Gulch Reservoir and in Juniper Canyon, and a pair of western screech-owls near the Bear Gulch Visitor Center, but no nests or fledglings were confirmed.

Primarily, the lack of breeding information on these raptor species was due not to lack of interest or capacity on the part of the raptor monitor, but because of the time constraints necessitated by the park management focus on prairie falcons and golden eagles, and the high-use, raptor

advisory areas. For future monitoring efforts allowing for more detailed breeding observations of a greater diversity of the raptor species in the park, I would offer the following recommendations.

First, providing the raptor monitor with occasional assistance in the field would help to alleviate the time constraints described above, and would allow for more detailed coverage of “non-target” raptor species in the park. This could be accomplished most effectively through a resource staff “half-position,” trained and supervised directly by the raptor monitor to allow for consistent monitoring data and adherence to survey protocols. Second, continuing to make use of the efforts and enthusiasm of staff and visitors observing raptor activity in the field would allow for the broader documentation of nesting raptor species seen this year. This could be achieved through regular communication with park staff and visitors, bi-weekly monitoring updates on raptor status at the park, and reminders on filling out wildlife observation cards. Third, more detailed training and information on accipiters, red-shouldered hawks, kites, owls, and kestrels should be made available to raptor monitors and other park staff. Literature on nesting habits, observation methodologies, and nesting phenology for these species would be beneficial, as would basic instruction provided by organizations such as GGRO (Golden Gate Raptor Observatory), Hawkwatch International, or PRBO (Point Reyes Bird Observatory). Finally, monitors should be very familiar with the standardized written set of raptor protocols, and these should be revised and edited on a regular basis. In particular, incoming monitors should thoroughly review the following: raptor monitoring techniques; raptor identification skills; navigation and orientation in the park backcountry; appropriate use of GPS and monitoring equipment; backcountry safety skills; management of raptor advisory areas; and guidelines for database management of field notes, wildlife observation cards, and archived nest site photographs.

In regards to effective monitoring and a standardized set of protocols, two key aspects of raptor monitoring deserve further discussion because they are difficult to quantify but are essential for providing the monitor with successful data on nesting phenology – timing of raptor observations, and ideal locations for watching nests. Both factors vary as the breeding season proceeds and ultimately require self-motivation, adaptability, and a sensitivity to gaining effective data on the part of the raptor monitor. For the 2004 prairie falcon breeding season, I found that afternoon and evening surveys were ideal in winter when determining where falcons would roost for the night, and in locating potential eyries. The falcons were most active about two to three hours before sunset, and circled and perched visibly – occasionally inspecting potential nest sites - in their respective territories before retreating to sleeping roosts for the night. Evening surveys also had the benefit of providing initial data on locations of vocalizing owls within the park. As the season proceeded, I found that it was useful to check on nest sites in specific territories at different times of the day. Nestlings seemed most active near sunrise and sunset, but even observations during the high temperatures of midday provided useful data on nestling numbers while adults were out hunting. Near fledging, falcon and other raptor young seemed most active from sunrise to 1100 hours, when they were most consistently practice-flapping and later flying and perching near the nest sites. Depending on the aspect of nest sites, morning and evening lighting provided varying levels of visibility into the nests, as well. As stated above, my recommendation would be that raptor monitors cultivate a philosophy and work attitude of adaptability to the timing of observations, observing raptor activity in response to the particular physical and behavioral conditions at a given nest territory.

The same general recommendations would apply to locating effective observation points for monitoring raptor territories and nest sites; remaining attentive to the behavior and movement of falcons and other raptors within given territories, raptor monitors should be adaptable to moving to different vantage points within nesting territories to most effectively observe raptor behavior and nesting phenology. Based on 17 years of data, the raptor monitoring protocol, photo points,

and GPS coordinates for watch spots over the past two years, raptor monitors should have the basic framework necessary to set up observation points as dictated by the behavior and nest selection of given raptor pairs and young in nest sites. This standardized framework, in combination with a flexibility to the physical and behavioral conditions within a specific nest territory, should allow the raptor monitor to consistently and effectively observe raptor nesting throughout the breeding season.

In its third and final year, the telemetry project provided foraging range and habitat data on prairie falcons and allowed me to gain a broader perspective and awareness of the hunting movements of tracked birds. More significantly for my duties as a raptor monitor, the banding of adult falcons and the attachment of radio transmitters and antennas provided a certain and visible demarcation of male versus female birds (with blue bands on left legs for males and right legs for females). Provided this study continues into the future, capturing adult and young prairie falcons will allow for fewer errors in data when identifying falcons associated with certain territories as well as providing more insight into the range of the prairie falcon.

In regards to raptor monitoring at the park, I would recommend the color banding of the entire prairie falcon population as a possibility, in addition to present telemetry efforts. Color banding of falcons in the park would provide much more extensive information on the raptors, including individual movements of single and paired falcons within breeding seasons and from year to year, rates on short- and long-term pair bonds, rates of birds returning to nest in the park annually, loyalty of individual falcons to specific territories, and fledgling survivorship and dispersal. Color banding could provide a valuable tool for continuing to broaden our experience and understanding of the prairie falcons as a sensitive species, a management concern for the park, and an amazing bird of prey that returns to breed at the park annually.

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This project would not be as successful as it is without the eyes and ears of helpful PNM employees. Therefore, I would like to thank the park employees for their help, encouragement, and passion for the raptors and wildlife diversity at PNM. I would also like to extend my appreciation to the park visitors, for their reports and observations on raptor sightings in the park, and for their appreciation and value of the importance of monitoring, managing, and protecting the nesting sites and breeding productivity of raptors in the park.

In particular, I would like to thank Keir Morse, Kirsten Lund, Angie Lucas, and Shauna Hee, for providing invaluable reports on new and historic raptor nest sites, including previously undocumented golden eagle nesting in the Narrows and roosting at South Chalone. Shelley Buranek also provided me with insight on the raptor monitoring program, her ongoing telemetry work, and unique information regarding the tracked falcons. I also thank Wendy Artz for her coordination of the International Migratory Bird Day events and programs, for her reports on raptor activity in the park, and her passion for observing birds in general throughout PNM. The following staff shared their experience, excitement, and observations of raptors with me throughout the season, granting me a more complete picture of raptor breeding and diversity at the park, and assisted in the effective management of raptor advisory areas: David Soto, Charles Ewing, Brant Porter, Tom Leatherman, Sharon Franklett, Jennifer Tiehm, Janet Cicero, and Wendy Artz.

Alacia Welch, an SCA (Student Conservation Association) intern and emergency hire staff member this year, also deserves my sincere thanks and gratitude for assisting me regularly in team observations of raptor territories, her skill in seeing and hearing raptor breeding behavior in falcon and red-tail hawk territories, and her consistent, meticulous efforts in managing the past 17 years of data in the raptor index database.

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## APPENDIX 1

This season's full-time Raptor Monitor was Gavin Emmons, assisted by SCA intern Alacia Welch. Welch assisted regularly in team-watches at large territories, and during the fledging of young at multiple territories on the same days. SCA students, park employee volunteers, and staff assisted me in the field as needed.

The total number of observation hours by staff was 680 hours. Volunteers' observation hours totaled 138. Total time in the field was 818 hours.

## APPENDIX 2

Through the course of the 2004 season, several changes were made to the 2004 Raptor Monitoring Protocol, and raptor monitoring databases. These are listed here as general raptor monitoring metadata, as “works in progress” that have not been finalized.

Traditionally, photo documentation of Pinnacles territories has been archived in the “photolog” and “divlog” Word documents. Because the photo information is most conducive to a database structure, the information in these files has been transferred into a FileMaker database, “Photolog.FP5,” contained in the “databases” folder in the “Breeding Raptors” folder. Information on this change will be added to SOP 9: Data Management, after the “Photolog” database has been finalized.

Records in the “raptorindex.FP5” database have been checked for quality by A. Welch, including all records from 1991 to 2004. Feeding / breeding data, dates, and times of observations have been entered in accurately for about 7000 records. Fields added to the database include a nest code field, and a comments field. A Word document, “metadata\_raptorindex,” was also developed to provide details on work done with the raptorindex.FP5 database, including records yet to be checked for quality and consistency. Changes to SOP #9 will be updated accordingly after the database is completely checked.

All records from the “breedingraptors-PRE 2000.FP5” database were transferred to the current “breedingraptors.FP5” database to assure consistency in the records, species, and territorial names. An additional field, territorial links, was created to detail raptor pairs occupying more than one territory in a season. A Word document, “metadata\_raptorindex,” was created to detail these changes, and to address missing historic records still needing documentation in the database.

The sections on GPS and GIS layers in SOP #9 will be revised in the future to reflect a more standardized approach to information that is currently being developed. In particular, off-trail routes to remote watchspots are being GPSed, and unique identifier codes for watchspots are being developed.